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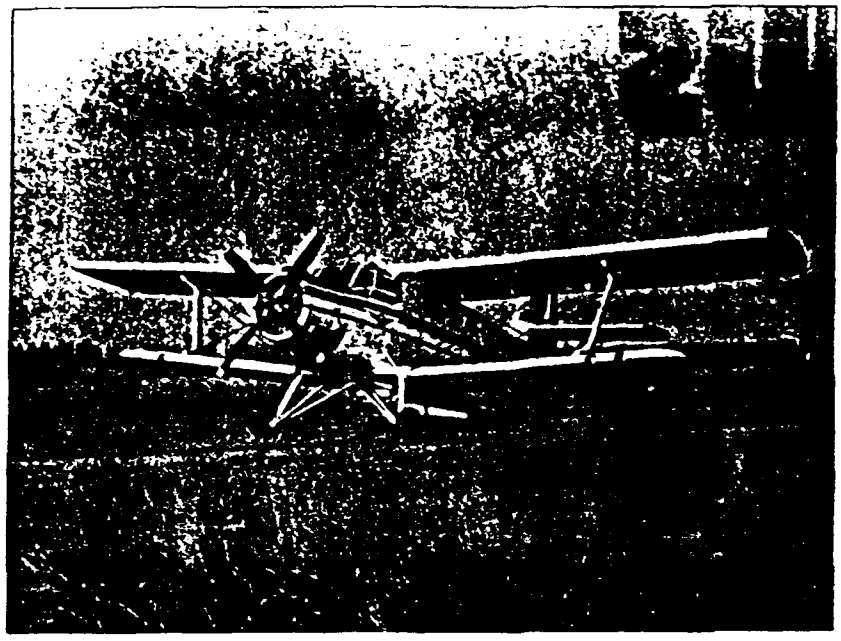
AN IMPROVED TRANSPORTING PLANE Y5B

The Y5 (Yuen 5) plane currently flying is now being modified and improved by the ministry of aviation and space industry of China. This modification project was carried out by the Shih-Jia-Juang airplane manufacturing corporation. Up to now, two prototype models were manufactured and flight and ground tests were conducted. The works related with the application of "supplemental model qualification verification" were completed and actual production should start in this year. The improved model is a multi-purpose plane with its major service in the area of agricultural and forestry operations. This new model was given a designation Y5B (Yuen 5B).

A great deal of contribution, in the general aviation business, have been made by the Y5 planes in the past 30 years and the social economical benefit was tremendous. At present, there are still tens of thousands of the similar planes (An-2) in USSR and the annual production of this plane in Poland is 300. Therefore, it has become one of the planes in the world with the longest production period and the biggest manufactured quantity. This is all due to many outstanding features it boasts:

* Large cargo bay; multi-purpose; suitable for agricultural, forestry, industrial, or passenger transport.
* Good safety features, with nice gliding and loss-of-speed characteristics, good super-low fly characteristics, good cabin view. There has never been any quality defects among the thousands of planes manufactured in China.



The Y5B plane improved by the ministry of aviation and space industry of China.

* Short take-off and landing distance, with only minimum requirement for the condition of the airport.
* Long-distance port-transferring capability, with more than 7 hours of continuous flight capability, high usability.

The superior low-fly, low-speed features of the Y5 plane, together with its excellent safety design, makes it one of the most advanced planes in its category. However, there are some problems, especially those reflected by clients, that should be addressed:

* The electronic equipment is obsolete and dependability is poor. The requirement of communication, especially for long-distance port-transferring, is hardly met.
* The working environment in the cockpit is poor. The temperature in the summer is especially high and the ventilation is very bad. There is also the concern of chemical agent contamination when its mission involves spray of chemical agents.
* The important equipment necessary for agricultural and forestry operations is usually lacking and for those available the functions are inadequate and imhomogeneity usually involves. After the spraying is stopped, minor traces of drug still leaks through (the tailing phenomenon) and contamination to the environment can be caused.
* The container for the chemical agent (the commercial capacity) is small and operational economy can be affected.

With regard to the problems mentioned above, the modification project was aimed at attacking the problems while maintaining the beneficiary features. The major improvements are:

* Part of the electronic equipments such as ultra-high frequency (UHF) station, automatic navigator, short-wave communication station, gyroscopic magnetic compass were improved. Their weights were reduced and the human-machine compatibility and operational dependability were improved so that the duty of the pilots could be somewhat relieved. Also, the instrument panel was re-arranged according to the requirements of Chinese Civil Aviation Regulation CCAR-23 so that the instrument, navigating handle, and switches could be more accommodated to the navigational needs.
* The working environment in the cockpit was also greatly improved, especially the hot/cool air conditioning system and ventilation system. A "micro-environment/singular cooling air-conditioning" system was also installed. The sealing of the cockpit door was re-designed to provide better hot-air/cool-air conditioning in winter and summer times and better sealing and less contamination in the cockpit during agricultural operations.
* The equipment for agricultural operations was re-designed to match the international standard and to realize normal-quantity, low-quantity, and ultra-low-quantity operations. The spraying homogeneity was improved and the "tailing" effect and the worry of agent contamination was

eliminated. The actual quantity of chemical agent used in the operation could be adjusted and indicator was installed to indicate the residual chemical agent. To further improve the safety feature, an emergency jettisoning capability was incorporated which was capable of jettisoning 1.5 tons of commercial payload in a few seconds.

* On the basis of the same equipment set-up as the original Y5 plane, the improved Y5B provided a higher commercial payload capability. The capacity of the chemical agent container and the commercial payload of the Y5 plane were 1.2 cubic meters and 1,000 kilograms, respectively, while those of the improved Y5B were 1.7 cubic meters and 1,424 kilograms, respectively. For spraying operations the net commercial payload can be 1,412 kilograms. The commercial payload could be further increased if the plane were over-loaded.

The multi-purpose feature was kept in the Y5B plane so that not only agricultural or forestry operations could be achieved, object-searching, passenger transporting, or even parachuting could also be accomplished with slight modifications. One of the Y5B prototypes was modified into an object-searching plane and had been operating in the Jen River area in the province of Canton with great success. At present, negotiation of contracts has been proceeding between the manufacturer and several local airliners and it is predicted that more order of Y5B will be received after 1990.

Total Accumulated Flight Time of 10,000 hours of Sino-America MD-82 Planes in 1988

The MD-82 planes, which is a product of the Sino-America joint effort, have accumulated a total of more than 10,000 flight hours (total flight hours was 10,056) and total flight distance of 6,500,000 kilometers since the first plane was purchased in July 1987. At present, there are five of these planes in the fleet of Shianghai Eastern Airlines and ShenYang Civil Aviation Services.

These five MD-82 planes are now entering the golden ages of their services and have become the backbone of Shianghai and Shenyang civil aviation services. At present, there are 53 international and domestic lines and 28 foreign airports were covered. The range of service covers all the west Pacific countries. The domestic airports covered are: Beijing, Shianghai, Guangzhou, Shenyang, Changchun, Harbin, Qiqihar, Dalian, Yentai, Qingtau, Hefei, Hangzou, Fuzhou, Xiamen, Chengdu, Gualin, Haikou. Regional airport includes Hongkong and international airports include Tokyo, Yokohama, Fukui, Osaka, Fukoka, Sendai, Okinawa, and Yomogata of Japan and Seoul of South Korea.

The following three features of the MD-82 plane were proved through the extensive flight experience:

(1) Dependability and Stable Quality: The flight hour of the first plane was 2,982 hours in the first year and the flight hour of the second plane was more than 2,500 hours. Both records exceeded the 2,000 hours annual capability rate. The average

daily capability rate of the five airplanes was 7.8 hours. The distance of a single take-off/landing maneuver was 3,050 kilometers and was equivalent to 85% of the design standard. Also, the record of a daily flight time of 17 hours and 10 minutes and daily flight distance of 11,950 kilometers were set. Based on an incomplete statistical analysis, the average defect rate was 3.5% (3.5 defects in every 100 hours of flight time) and the average claim rate was 1.5% which was far less than the average defect rate of similar planes. Up to now, no significant safety defects had occurred in the Shenyang and Shianghai lines. On the contrary, excellent accommodating capability for airport, weather, and altitude have been demonstrated.

(2) High Service Rate and Economical Savings: Statistics showed that the MD-82 plane boasted a daily capability rate of 7.5 hours in Shianghai and 8.2 hours in Shenyang, an excellent record even compared with the big airliners in the world. Each month, two long-distance flights would be assigned to almost half of the flight dates for Shianghai Eastern Airline while the average flight time for Shenyang Airline was more than 9 hours because of the extensive range of service area. The fourth MD-82, purchased on July 16 of last year, set the record of the highest daily capability of 8.7 hours in Shianghai. Compared with the condition of the five MD-82's purchased from Long Beach, USA in December 1983, the average claim rate was the same (both were 1.5%) while the average flight time was higher (by 15%).

Analysis showed that the passenger carrying capacities for the three MD-82's of Shianghai Eastern Airline and the two MD-

82's of Shenyang Airline were 75%-85% and 85%-95%, respectively. The average capacities were 85% and 90% for Shianghai and Shenyang, respectively. During the past few years, the number of planes of Shenyang Airline was few and economical benefit was low. However, with the increase of the number of MD-82 planes, Shenyang Airline has become a profitable organization.

(3) Because of the low defect rate, the airplane carries a good reputation and since the amount of payload and passenger was great and the number of airplanes was few, the Sino-America MD-82 planes were put into service immediately after they were purchased and average flight time per month amounted to 250 hours with a maximum of 300 hours. The average daily flight distance was approximately 6,000 kilometers. Even with such heavy usage rate, there has never been any significant defect or flight error that the airplane should be called back. Compared with similar planes, the total average defect rate and claim rate were also lower. The initial defect period for most airplanes is between 0 and 500 hours and it would be highly desired if the initial defect period can be over in the first 100 hours. The initial defect period of MD-82 is short and the error flight rate was about 1%. Because of the low defect rate of MD-82, it has earned a high credit among the customers. There was a somewhat outstanding incident for the first MD-82 of Shianghai Airline, however, that in the first 100 hours, three consecutive defects occurred due to engine vibration problems. The second MD-82 also exhibited the same engine problem in the first 200 hours and, as a result, the engines were replaced before the scheduling time.

Analysis showed that most of the defects of Sino-America MD-82 occurred in the electronic/electrical devices, which amounted to 80% of the defects, and very few defects were related with structure or circuitry. The B-2109 plane of Shianghai Airline has been flying for over 1,100 hours and total accumulated number of defects was only 18, with 13 of them claimed. This is also the best flight record of the Sino-America MD-82 planes.

These results have attracted the attention of civil aviation corporations of the world, especially some of the Asian, African, and European countries. Not only many domestic and local civil aviation corporations are encouraged to purchase these planes, foreign corporations have also been seeking the possibility of purchasing these planes through various channels.

The facts have proved that the joint-effort of Shianghai Aviation Industrial Corporation and McDonald Douglass is a successful one. It also proved that it is possible to improve and strengthen the quality of Chinese civil aviation industry through import of foreign technologies. At present, the joint-effort project has been expanded to explore the possibility of deeper exchange of technology and management skill, and expansion of the range of co-operation. According to the project, the sixth plane was delivered at the end of last year, the seventh plane will be delivered this year and the eighth plane in 1990. Four planes will be delivered in 1991 and shipment of all the planes will be completed by July 25, 1991. (Jian)

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